ture and capillary circulation, but likewise of the medium through which this ratio is maintained. For, on the very face of the facts, it is seen that the primary operation of cold is upon nervous parts, and that through them the effect is propagated to the capillaries, which are under their influence. What then is the nature of the action of cold on the nervous system? How does the simple abstraction of warmth affect it?

In the first place is its operation mechanical? Can a tissue of the structure of nerve be free from the laws of expansion and contraction from differences in temperature? On this subject there is at present nothing known. Another question which, like the above, has probably never been mooted before, is, what relation subsists between the temperature and the due performance of the functions of nerves? The abstraction of heat alters, and finally destroys their sensibility, at the same time that it affects to a less or greater degree the functions of the capillaries, and those of the muscles of organic and voluntary motion which in health are subservient to their control. If a reduction of temperature can produce such results, as is manifestly the case, nothing can be more important than to enquire for what purpose is animal temperature sustained in the body, what is its use? Is it the natural stimulant of the nervous system?

These questions are not of a nature to be no sooner asked than replied to: they involve a wide subject for enquiry. But to whatever office the 98th degree of heat on Fahrenheit's scale applies in the maintenance of the vital laws, whether as relating to chemical or mechanical states of the fluids or tissues, one thing is sure, which is that when heat is abstracted from the body, the nervous functions are reduced, (Table III, 5, 19), and those dependent upon them affected proportionately, as observed, not only in the enumeration already made, (Table v, 8 et seq.), but in the symptoms of collapse, caused by intense cold (Table III. et seq.).

The earliest effect of cold upon the nervous system is observable in the excito-capillary nerves, and at this period the capillary circulation suffers to a greater or less extent. And now one of the most remarkable facts in physiology is observable. The capillaries through which the terminations of nerves are acted upon by animal heat, (such terminations being the only parts capable of being acted upon functionally by the blood or other stimuli,) are empty, and consequently, although an abundance of heat remains in the blood, its influence is not impressed upon the nerves, and a sensation of cold results throughout the body. It is thus that heat, a natural stimulant of the nervous functions, is withdrawn, not from the system at large, but from the terminations of nerves; and that a sensation of cold is conveyed by them like any other impression, to the sensorium.

It is not a little curious, that this state of things happens at a time when the temperature of the body is several degrees above the natural standard. De Haen (*Ratio Medendi*) was the first to discover, that the temperature of the body is elevated during rigor. This fact, which was doubted by some of his successors, has been confirmed by Gavarret and others, in recent times. De Haen says, "*Tempore frigoris homini intolerabilis, cum pulsu contractiore, minore, thermometer signat octo gradus ultra calorem natu-*

ralem, &c." The phenomenon, however, is variable, though its presence is sufficiently constant to justify its being classed among the principal symptoms of rigor.

CASE OF INSANITY, WITH GANGRENE AND MORTIFICATION OF A LIMB; FOLLOWED BY RECOVERY.

TO THE EDITOR OF THE PROVINCIAL MEDICAL AND SURGICAL JOURNAL.

SIR,

Will you do me the favour to publish the following case in an early number of your ably conducted Journal.

I am, Sir,

Faithfully yours,

T. H. STARR.

Leamington, April 30, 1845.

On the 4th of December last, I was sent for to Rothwell, a large village four miles distant from Kettering, Northamptonshire, at which latter place I was then residing, to visit a Mrs. Smart, in consultation with Mr. Carpenter, who had been in attendance upon the case for about three weeks. The patient was in the 35th year of her age, and I specify this somewhat distinctly, since gangrene to so great an extent, and of a spontaneous and an inflammatory kind, is very unusual at so early a period of life. Before entering into a detail of Mrs. Smart's peculiar condition at the time of my being called in, I ought to premise, in order that the singularity of the case may be duly appreciated, that she had been married some years; had sustained several miscarriages, but had never given birth to a living child. These repeated short-comings had created in her mind a deep feeling of disappointment. For more than a twelvemonth preceding the distressing crisis which I am about to describe, she had suffered from a constant depression of mind, amounting to hypochondriasis, in which disorder the functions of the liver and the womb were especially implicated. Under these circumstances she called upon me for my advice about the middle of last August. Her prominent symptoms at that period were habitual constipation, with difficulty and irregularity of the whole digestion; the complexion remarkably sallow; whilst the inactivity of the lymphatic system was evinced by considerable œdema of the lower extremities; the catamenia were entirely suppressed, and the circulation was feeble. The treatment that I prescribed proved advantageous, for in a fortnight or three weeks the disordered functions were in a great degree restored, and the skin had acquired a healthier tint. A reaction likewise took place in the mind, which seemed to participate, as it were, in the general improvement of the body. She became cheerful, so much so, indeed, that instead of viewing things any longer through a sombre medium, her mental visions were mantled with the *couleur de rose*.

We might be led to infer that a principle of compensation was now at work; that the brain, in shaking off the fetters by which it had been enthralled, had only escaped the "durance vile" of melancholy, to luxuriate in the agreeable images displayed to it by the opposite morbid state of exhalation. In all pro-

bability this reaction was a preliminary stage of the mania which ultimately burst forth.

At this point in my patient's history, when incessant medical superintendence was peculiarly requisite, an *hiatus maxime defendendus* occurred in my attendance, for, as she felt her spirits improved, she was unwilling to continue subject to the control and expence of medical treatment, and consequently dispensed with my services. However, in a month or five weeks, Mrs. S. again came to me, her legs being at the time very oedematous, and one of them in a state of ulceration; she was, nevertheless, animated in her manner, and sanguine about herself. Her husband informed me that her habits had undergone a material change; for example, she had bought expensive dress, and squandered money in various ways, not at all in accordance with her natural disposition.

With the exception of one more interview, a few days after this, I neither heard nor saw anything of the patient for several weeks; at length I was informed that she had been suddenly seized with confirmed mania, and that Mr. Carpenter, the resident surgeon, and her former medical adviser, had been called in to attend her. The first and chief measure which he adopted was the abstraction of blood from the anterior temporal branch of the superficial temporal artery.

It was nearly three weeks after this, viz., on the 4th of December, that I was sent for, when I found Mrs. Smart in a most deplorable state. I was told that about ten days before, her right hand and forearm became cold and motionless. In defiance of the remedies then and there employed, mortification rapidly set in, was still advancing upwards, and had reached to about an inch and a half above the elbow joint, below which the limb presented, for the most part, a black and putrid mass. The nates were likewise covered with sores, having a gangrenous appearance; the stomach was irritable, with frequent vomiting; the mouth and tongue were parched and somewhat foul; the pulse rapid but feeble; considerable emaciation of the frame; the eye was unusually bright, and betrayed the wild and incoherent expression of maniacal delirium, in the ravings of which, the thoughts and ideas dwelt upon amorous subjects; indeed, Mr. Carpenter thought the term nymphomania might be applied to the case. I have no doubt the mind was harassed by this train of images, from the joint agency of moral and physical impressions, arising from the disappointment to her maternal hopes and the previous irregular states of the functions of the womb. The symptoms taken collectively indicated a very certain and speedy dissolution, and in no case that I ever witnessed would death have proved a more friendly visitor, or afforded more welcome relief to human suffering. An operation under the circumstances I have narrated, would have been worse than useless, since there was not the least evidence of inflammatory action where the living encountered the dead structure. It seemed to me, that the only possible chance of saving life against such desperate odds, was by a decidedly cordial and stimulating plan of treatment, in which opium should be introduced as an essential ingredient, so that in defiance as it were of the cerebral excitement, we might rouse a vital action adequate to the separation of the dead parts. I prescribed nitric acid, in combination with cinchona, cascarrilla, and the sedative solution of

opium. Port wine and yeast poultices with turpentine, were forthwith applied to the arm and nates, whilst strong broth and other nutriment, with port wine and other stimulants, were administered as freely as the stomach would permit.

The good effects of this plan soon manifested themselves; the irritability of the stomach subsided, and an inclination for food returned. At my visit the following day, I was agreeably surprised to hear that she had slept quietly for some hours during the night, and although the mind was fearfully deranged, she was upon the whole more tranquil. The same treatment was therefore continued, and as she suffered from what seemed to be false labour pains, and the bowels not having acted, I prescribed three grains of calomel with one of opium, and also a clyster in the course of an hour or two, if the bowels were not previously moved. This was not required. The calomel and opium were repeated for many successive nights. The evacuations under its use became moderate and regular.

In the course of a few days the progress of the gangrene was clearly arrested, and the sloughing process had commenced. She had from time to time a brief lucid interval, when she expressed an earnest desire that her arm might not be removed by the knife. Her husband and other relatives being firmly impressed with the certainty of her death, united in the same objection. In the course of a week the tongue presented a moist and secreting surface, when I immediately had recourse to quinine. I may shortly observe, that with sundry variations, according to circumstances, in the administration of the medicines, the plan of treatment we adopted at the outset was persevered in. The quinine agreed remarkably well; the sores on the nates threw off a superficial slough, and healed readily. Towards the latter part of December we proposed the amputation of the arm, with confidence as to the result. The parties obstinately refused to accede to it, as they still believed the disease would be fatal. I felt satisfied that the system now showed indications of power to struggle successfully with its manifold and terrific infirmities.

At the end of the month I discontinued my attendance, and left the surgical management of the case entirely to Mr. Carpenter. Three weeks after, when the soft parts were quite divided, he was permitted to saw through the bone, and the decayed member, which, by the bye, had been almost embalmed with antiseptics, was finally removed. The stump granulated freely and did well. The general circulation had become steadier; she eat, drank, and slept well; and with the exception of a chronic mental aberration, Mrs. Smart was in the high road towards recovery. The maniacal disturbance, though subdued, kept possession of her mind until the end of February, when, I am happy to state, a gradual change for the better took place. In a week or two more the faculties of the mind had recovered their integrity, and reason resumed her sway.

I paid Mrs. S. a farewell visit at the beginning of the present month, the stump was not quite healed, but she was otherwise perfectly convalescent both in mind and body.

The circumstance which throws over this case a peculiar interest, is, that sphacelus destroyed an entire

limb, without being preceded by any of the usual causes or signals of such an event. We know that gangrene sometimes proves the sequel of violent inflammation; we know likewise, that an obstruction to the flow of arterial blood through a limb, will produce the same effect, such for instance, as sometimes occurs after the operation for aneurism; injuries are sometimes productive of a like catastrophe; and, lastly, as an idiopathic affection, to which the present case bears some slight analogy, we have the *gangræna senilis*.

My opinion is, that the death of the limb in this instance arose from a stagnation of blood, induced by a suspension of the nervous or vital energy, which the brain, in the turmoil of its insanity, withheld as it were from the part affected.

ON THE GENERAL CHARACTER OF LIVING BEINGS, AND MORE ESPECIALLY OF MAN.

(Continued from page 294.)

(Second Paper.)

Primary Division of the Animal Kingdom.

External, or dermo-skeleton. Divisions. Examples.

Plant-like and aggregate	. radiata	polypes
Unsymmetrical	. mollusca	oyster
Elongated with bi-lateral symmetry, and divided into segments.	} articulata	centipede
Instinct and the organic functions prevail in these divisions.		

Internal, on neuro-skeleton.

A vertebral column vertebrata serpent

High development of the nervous system. An *intel-ligent* will rather than an undescerning uncontrollable instinct.

One remarkable character distinguishes the skeleton of the invertebrated classes from that of the vertebrata, viz., that it is not vascular, but consists of a superficial deposit, just as the nails and horns of higher animals.

The above named distinctions are given as the most striking characters of each division, though by no means apparent in every species. The radiata, in many points, resemble plants, especially in their circular or flower-like shapes, and in their tendency to assume a compound character by the union of many individuals in one structure. The most evident and characteristic distinctions of the mollusca are negative rather than positive, and they are known rather from their want of likeness to the other divisions than from any analogy among themselves. The want of symmetry in the arrangement of their organs is a common character of this group. The two next divisions are sufficiently characterized by the points stated in the table.

Classes of Vertebrata.

Cold-blooded—	Classes.	Examples.
Breathing by gills . . .	fishes	cod
" " lungs . . .	reptiles	lizard
Hot-blooded—		
Oviparous	birds	fowl
Viviparous	mammalia	ox

Mammalia alone are viviparous, producing their young alive; but birds are sufficiently separated from

the other two classes by their hot blood, the high development of all their functions, and consequent great activity.

The nature of the respiratory organs sufficiently separates the reptile from the fish; the respiratory membrane in the latter being external, exposes the blood to the action of oxygen contained in the water where the fish constantly resides; but reptiles breathe by lungs, as do the higher vertebrata, alternately receiving the atmospheric air into the lungs, and expelling it from them.

There is a group (amphibia) between reptiles and fishes combining the character of both, and raised to the dignity of a separate class by some naturalists. The frog begins life as a fish, undergoes a metamorphosis, and then assumes the character of reptiles. Again, other creatures *permanently* retain the various intermediate states of development, *e. g.*, the proteus and siren.

As we ascend the scale of the development of living beings, all the organs and functions are observed to become more and more *concentrated*, until in the mammalia they have assumed their most concentric form. Take, for instance, the respiratory organs; these are *spread out* in plants as leaves, and in the bird are distributed into large air-cells and the interior of bones, and are thus extended over great part of the body; but in mammalia the lungs are *confined* to the thorax.

Subdivisions of Mammalia.

Non-placental—	Orders.	Examples.
	1. Marsupialia	kangaroo
	2. Monotremata	ornithorhynchus.

Placental—

Ungulated (hoofs)

3. Ruminantia	sheep
4. Pachydermata	horse

Ungiculated (claws)

Not having four incisors and two canines in each jaw—

5. Cetacea	dugong
6. Edentata	armadillo
7. Rodentia	rat
8. Carnivora	cat
9. Insectivora	hedgehog

Four incisors and two canines in each jaw—

Winged	10. Cheiroptera	bat
Four-handed	11. Quadrumana	monkey
Two-handed	12. Bimana	man

The very imperfect state of the foetus at birth in the two lowest orders of mammalia, sufficiently distinguishes them, and serves as a point of approach to the class of birds. Those orders, in which the young are nourished by means of a placenta, are separated into two groups, by the development of the claws; in the lowest these are *consolidated* into hoofs, but in the higher orders, there is a more or less perfect *separation* of the claws. The three highest orders are sufficiently distinguished from all the rest by being the only ungiculated mammals, having four incisors and two canines in each jaw; and the characters stated in the table clearly separate them from one another. I shall not enter into any further detail on the peculiarities of the twelve orders of mammalia, but at once proceed to the main object of these papers—to point out the peculiarities of man.

(To be continued.)